ASSIGNMENT-3

BUILD CNN MODEL FOR CLASSIFICATION OF FLOWERS

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
cd /content/drive/MyDrive
```

```
/content/drive/MyDrive
```

```
!unzip '/content/drive/MyDrive/Flowers-Dataset/Flowers-Dataset.zip'
```

```
Archive:  /content/drive/MyDrive/Flowers-Dataset/Flowers-Dataset.zip
  inflating: flowers/daisy/100080576_f52e8ee070_n.jpg
  inflating: flowers/daisy/10140303196_b88d3d6cec.jpg
  inflating: flowers/daisy/10172379554_b296050f82_n.jpg
  inflating: flowers/daisy/10172567486_2748826a8b.jpg
  inflating: flowers/daisy/10172636503_21bededa75_n.jpg
  inflating: flowers/daisy/102841525_bd6628ae3c.jpg
  inflating: flowers/daisy/10300722094_28fa978807_n.jpg
  inflating: flowers/daisy/1031799732_e7f4008c03.jpg
  inflating: flowers/daisy/10391248763_1d16681106_n.jpg
  inflating: flowers/daisy/10437754174_22ec990b77_m.jpg
  inflating: flowers/daisy/10437770546_8bb6f7bdd3_m.jpg
  inflating: flowers/daisy/10437929963_bc13eebe0c.jpg
  inflating: flowers/daisy/10466290366_cc72e33532.jpg
  inflating: flowers/daisy/10466558316_a7198b87e2.jpg
  inflating: flowers/daisy/10555749515_13a12a026e.jpg
  inflating: flowers/daisy/10555815624_dc211569b0.jpg
  inflating: flowers/daisy/10555826524_423eb8bf71_n.jpg
  inflating: flowers/daisy/10559679065_50d2b16f6d.jpg
  inflating: flowers/daisy/105806915_a9c13e2106_n.jpg
  inflating: flowers/daisy/10712722853_5632165b04.jpg
  inflating: flowers/daisy/107592979_aaa9cdfe78_m.jpg
  inflating: flowers/daisy/10770585085_4742b9dac3_n.jpg
  inflating: flowers/daisy/10841136265_af473efc60.jpg
  inflating: flowers/daisy/10993710036_2033222c91.jpg
  inflating: flowers/daisy/10993818044_4c19b86c82.jpg
  inflating: flowers/daisy/10994032453_ac7f8d9e2e.jpg
  inflating: flowers/daisy/11023214096_b5b39fab08.jpg
  inflating: flowers/daisy/11023272144_fce94401f2_m.jpg
  inflating: flowers/daisy/11023277956_8980d53169_m.jpg
  inflating: flowers/daisy/11124324295_503f3a0804.jpg
  inflating: flowers/daisy/1140299375_3aa7024466.jpg
  inflating: flowers/daisy/11439894966_dca877f0cd.jpg
  inflating: flowers/daisy/1150395827_6f94a5c6e4_n.jpg
  inflating: flowers/daisy/11642632_1e7627a2cc.jpg
  inflating: flowers/daisy/11834945233_a53b7a92ac_m.jpg
  inflating: flowers/daisy/11870378973_2ec1919f12.jpg
  inflating: flowers/daisy/11891885265_ccefec7284_n.jpg
  inflating: flowers/daisy/12193032636_b50ae7db35_n.jpg
```

```
  inflating: flowers/daisy/12348343085_d4c396e5b5_m.jpg
  inflating: flowers/daisy/12585131704_0f64b17059_m.jpg
  inflating: flowers/daisy/12601254324_3cb62c254a_m.jpg
  inflating: flowers/daisy/1265350143_6e2b276ec9.jpg
  inflating: flowers/daisy/12701063955_4840594ea6_n.jpg
  inflating: flowers/daisy/1285423653_18926dc2c8_n.jpg
  inflating: flowers/daisy/1286274236_1d7ac84efb_n.jpg
  inflating: flowers/daisy/12891819633_e4c82b51e8.jpg
  inflating: flowers/daisy/1299501272_59d9da5510_n.jpg
  inflating: flowers/daisy/1306119996_ab8ae14d72_n.jpg
  inflating: flowers/daisy/1314069875_da8dc023c6_m.jpg
  inflating: flowers/daisy/1342002397_9503c97b49.jpg
  inflating: flowers/daisy/134409839_71069a95d1_m.jpg
  inflating: flowers/daisy/1344985627_c3115e2d71_n.jpg
  inflating: flowers/daisy/13491959645_2cd9df44d6_n.jpg
  inflating: flowers/daisy/1354396826_2868631432_m.jpg
  inflating: flowers/daisy/1355787476_32e9f2a30b.jpg
  inflating: flowers/daisy/13583238844_573df2de8e_m.jpg
  inflating: flowers/daisy/1374193928_a52320eafa.jpg
```

```
pwd
```

```
'/content/drive/MyDrive'
```

IMAGE AGGUMENTATION

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True,vertic
```

```
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
pwd
```

```
'/content/drive/MyDrive'
```

```
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers",target_size=(6
```

```
Found 4317 images belonging to 5 classes.
```

```
x_test=test_datagen.flow_from_directory(r"//content/drive/MyDrive/flowers",target_size=(64
```

```
Found 4317 images belonging to 5 classes.
```

```
x_train.class_indices
```

```
{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

CREATE MODEL

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten,Dense
```

```
model=Sequential()
```

ADD LAYERS(Convolution, MaxPooling, Flatten)

```
model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation='relu'))
```

```
model.add(MaxPooling2D(pool_size=(2,2)))
```

```
model.add(Flatten())
```

```
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 62, 62, 32)        896

 max_pooling2d (MaxPooling2D  (None, 31, 31, 32)       0
 )

 flatten (Flatten)           (None, 30752)             0

=================================================================
Total params: 896
Trainable params: 896
Non-trainable params: 0
_________________________________________________________________
```

```
32*(3*3*3+1)
```

```
896
```

```
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
```

```
model.add(Dense(5,activation='softmax'))
```

COMPILE THE MODEL

```
model.compile(loss='categorical_crossentropy',metrics=['accuracy'],optimizer='adam')
```

```
len(x_train)
```

```
180
```

```
4317/24
```

```
179.875
```

FIT THE MODEL

```
model.fit(x_train, epochs = 5, validation_data=x_test, steps_per_epoch=len(x_train), valid
```

```
Epoch 1/5
180/180 [==============================] - 840s 5s/step - loss: 1.3629 - accuracy: 0
Epoch 2/5
180/180 [==============================] - 60s 336ms/step - loss: 1.0366 - accuracy:
Epoch 3/5
180/180 [==============================] - 61s 340ms/step - loss: 0.9553 - accuracy:
Epoch 4/5
180/180 [==============================] - 61s 337ms/step - loss: 0.8881 - accuracy:
Epoch 5/5
180/180 [==============================] - 60s 336ms/step - loss: 0.8193 - accuracy:
<keras.callbacks.History at 0x7ff8dc0b3c10>
```

SAVE THE MODEL

```
model.save('flowers.h5')
```

```
ls flowers/
```

```
daisy/  dandelion/  rose/  sunflower/  tulip/
```

TEST THE MODEL

```
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

```
model=load_model('flowers.h5')
```

```
img=image.load_img (r"/content/drive/MyDrive/flowers/rose/353897245_5453f35a8e.jpg")
```

```
img
```

```
img=image.load_img (r"/content/drive/MyDrive/flowers/rose/353897245_5453f35a8e.jpg", targe
```

```
img
```

```
x=image.img_to_array(img)
```

```
x
```

```
array([[[ 26.,   5.,   4.],
        [192.,   3.,   0.],
        [171.,   1.,   4.],
        ...,
        [ 10.,   7.,   2.],
        [ 15.,   8.,   2.],
        [ 21.,  12.,   3.]],

       [[ 83.,   4.,   9.],
        [173.,   0.,   0.],
        [129.,   5.,   7.],
        ...,
        [  4.,   3.,   0.],
        [  8.,   4.,   1.],
        [ 12.,   7.,   3.]],

       [[186.,   0.,   6.],
        [160.,   0.,   2.],
        [159.,   0.,   6.],
        ...,
        [  0.,   0.,   0.],
        [  3.,   1.,   2.],
        [  7.,   3.,   0.]],

       ...,

       [[  8.,   2.,   2.],
```

```
               [  7.,   1.,   1.],
               [  6.,   2.,   3.],
               ...,
               [  0.,   0.,   0.],
               [  0.,   0.,   0.],
               [  0.,   0.,   0.]],

              [[  6.,   2.,   1.],
               [  5.,   1.,   0.],
               [  6.,   2.,   1.],
               ...,
               [  0.,   0.,   0.],
               [  0.,   0.,   0.],
               [  0.,   0.,   0.]],

              [[  4.,   0.,   0.],
               [  1.,   0.,   0.],
               [  2.,   0.,   1.],
               ...,
               [  0.,   0.,   0.],
               [  0.,   0.,   0.],
               [  0.,   0.,   0.]]], dtype=float32)
```

```
x=np.expand_dims(x,axis=0)
```

```
x
```

```
     array([[[[ 26.,   5.,   4.],
              [192.,   3.,   0.],
              [171.,   1.,   4.],
              ...,
              [ 10.,   7.,   2.],
              [ 15.,   8.,   2.],
              [ 21.,  12.,   3.]],

             [[ 83.,   4.,   9.],
              [173.,   0.,   0.],
              [129.,   5.,   7.],
              ...,
              [  4.,   3.,   0.],
              [  8.,   4.,   1.],
              [ 12.,   7.,   3.]],

             [[186.,   0.,   6.],
              [160.,   0.,   2.],
              [159.,   0.,   6.],
              ...,
              [  0.,   0.,   0.],
              [  3.,   1.,   2.],
              [  7.,   3.,   0.]],

             ...,

             [[  8.,   2.,   2.],
              [  7.,   1.,   1.],
              [  6.,   2.,   3.],
              ...,
              [  0.,   0.,   0.],
```

```
                [  0.,   0.,   0.],
                [  0.,   0.,   0.]],

               [[  6.,   2.,   1.],
                [  5.,   1.,   0.],
                [  6.,   2.,   1.],
                ...,
                [  0.,   0.,   0.],
                [  0.,   0.,   0.],
                [  0.,   0.,   0.]],

               [[  4.,   0.,   0.],
                [  1.,   0.,   0.],
                [  2.,   0.,   1.],
                ...,
                [  0.,   0.,   0.],
                [  0.,   0.,   0.],
                [  0.,   0.,   0.]]]], dtype=float32)
```

```
y=np.argmax(model.predict(x),axis=0)
```

```
y
```

```
array([0, 0, 0, 0, 0])
```

```
x_train.class_indices
```

```
{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

```
index=['daisy','dandelion','rose','sunflower']
```

```
index[y[0]]
```

```
'daisy'
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/dandelion/139124974_9e3ba69f6c.jpg", t
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower']
index[y[0]]
```

```
'sunflower'
```

```
img
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/144099102_bf63a41e4f_n.jpg", tar
```

```
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=0)
index=['daisy', 'sunflower','dandelion','rose']
index[y[0]]
```

```
'daisy'
```

```
img
```

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